Wisconsin Guiding Principles for Teaching and Learning:

What Do They Look Like in Mathematics Classrooms?

Wisconsin's Guiding Principles for Teaching and Learning provide important guidance for Wisconsin classrooms. Each of the guiding principles has implications for teaching and learning in mathematics classrooms. Wisconsin educators and mathematics leaders have identified some of the characteristics that should be present in mathematics classrooms at all levels.

1. Every student has the right to learn significant mathematics.

Mathematical proficiency is essential for every student in Wisconsin. Students need to be able to formulate, represent, and solve problems; explain and justify solutions and solution paths; and see mathematics as sensible, useful, and worthwhile. In order to achieve this vision, all students must have access to challenging, rigorous, and meaningful mathematics. Schools and classrooms need to be organized to convey the message that all students can learn mathematics and should be expected to achieve.

What does this look like in a mathematics classroom?

- ✓ All students are engaged in meaningful and challenging mathematics tailored to their needs.
- ✓ All students have the opportunity to develop both conceptual understanding and procedural fluency.
- ✓ All students are given opportunities to see connections between mathematical concepts.
- ✓ All teachers intentionally orchestrate classroom discourse to scaffold student learning and build understanding.
- ✓ All students collaborate on purposeful tasks.
- ✓ All students show evidence of developing proficiency in the *Standards for Mathematical Practice*.

2. Mathematics instruction must be rigorous and relevant.

Teachers focus on engaging students in using mathematical reasoning, making mathematical connections, and modeling and representing mathematical ideas in a variety of ways. The mathematics curriculum needs to integrate and sequence important mathematical ideas so that mathematics makes sense. Teachers use rich tasks to engage students in the development of conceptual understanding and procedural skills. An emphasis on connections within mathematics helps students see mathematics as a coherent and integrated whole rather than as a set of isolated and disconnected skills and procedures. Through mathematical applications, students recognize the usefulness of mathematics and appreciate the need to study and understand mathematical skills and concepts.

What does this look like in a mathematics classroom?

- ✓ Curriculum is organized within and across grade levels and be integrated within and across strands.
- ✓ Students see how various mathematics topics are related, not only within mathematics, but to other disciplines, the real world, and their daily lives.
- ✓ Students and teachers strategically use precision and the vocabulary of mathematics to communicate orally and in writing in order to represent mathematical thinking, solution paths, and solutions.

- ✓ Representational models are created and defended to enhance depth of understanding and to reinforce the connections to mathematics and to students' lives.
- ✓ Lessons are structured to focus on specific learning goals and organized in a format to facilitate student understanding and include a summary of the important mathematics.
- ✓ Teachers and students use questions to challenge and progressively deepen students' mathematical understanding.
- ✓ Instruction is differentiated to challenge and support each student.

3. Purposeful assessment drives mathematics instruction and affects learning.

Teachers measure mathematical proficiency by using a variety of purposeful assessments before, during, and after instruction. Rich assessment tasks ask students to demonstrate their understanding by representing mathematical situations, solving problems as developed in the classroom, and justifying their solutions. Valuable assessments provide both students and teachers with the opportunity to reflect on students' mathematical communication, precision, and reasoning. Teachers use resulting data to adapt their instruction and the learning environment so that all students will understand new mathematics concepts and content.

What does this look like in a mathematics classroom?

- ✓ Teachers measure mathematical proficiency by using a variety of purposeful assessments before, during, and after instruction.
- ✓ Teachers adjust instruction based on assessment data to meet the needs of all students.
- ✓ Teachers utilize questions and assessment tasks that require students to explain, represent, and justify mathematical understandings and skills.
- ✓ Teachers select or design assessment tasks which provide information about the depth of student understanding.
- ✓ Student learning is assessed through a variety of response formats that include writing, discussions, symbolic representations, sketches, models, tables, and graphs.

4. Learning mathematics is a collaborative responsibility.

Collaborative structures, within the mathematics classroom as well as in the school community, support the teaching and learning of mathematics. Students develop mathematical habits of mind through purposeful interactions in the classroom. Teachers co-create contexts, conditions, and assessment strategies for an interdependent learning environment. Opportunities for students to communicate the solutions, solution paths, and justifications are present in mathematics lessons.

What does this look like in a mathematics classroom?

- ✓ Students explain and defend their thinking and respectfully critique the reasoning of others.
- ✓ Teachers design and select tasks that encourage students to collaboratively explore multiple solution paths and which challenge students to think deeply about real problems and important mathematics.
- ✓ Teachers intentionally develop students' ability to collaborate in mathematics.
- ✓ Teachers collaborate to engage in tasks such as analyzing student work, identifying teaching strategies, and planning for instruction.

5. Students bring strengths and experiences to mathematics learning.

Students bring informal experiences of mathematics from their home and community to the mathematics classroom. They may enter classrooms with varying levels of mathematical misconceptions and confidence in their ability to do mathematics. Schools and teachers must build upon students' prior knowledge and intuitive understanding of mathematical ideas in order to connect the formal study of mathematics to students' ongoing experiences. Teachers need to continually identify students' strengths and weaknesses as a basis to develop tasks and experiences that will capitalize on student strengths and address weaknesses and misconceptions.

What does this look like in a mathematics classroom?

- ✓ Students are engaged in rich tasks and purposeful questioning that help teachers identify and develop student knowledge and understanding.
- ✓ High and clear mathematics expectations are set for each student.
- ✓ Students share mathematical thinking. Multiple solution strategies are welcomed and discussed.
- ✓ Teachers listen to students' mathematical discussions, or assess written work, and predicate further instruction based on what they see and hear.
- ✓ Misconceptions or weaknesses are identified through meaningful discussions and activities and are used to build student understanding of important mathematical concepts and skills.

6. Responsive environments engage mathematics learners.

Teachers utilize strategies that create effective mathematics environments. These environments use high quality mathematics curriculum and instruction in response to the understanding that not all students learn at the same pace or in the same way. Student engagement, perseverance, and learning are increased when teachers respond to students' interests, learning profiles, and readiness. The Standards for Mathematical Practice are evident in a responsive environment.

What does this look like in a mathematics classroom?

- ✓ Teachers value multiple solution paths, representations, explanations, and justifications.
- ✓ Teachers use formative assessment of students' needs and mathematical understandings to make intentional decisions for differentiating instruction.
- ✓ Teachers employ a variety of instructional strategies.
- ✓ Students are engaged in mathematical discourse.
- ✓ Teachers use student interests (when appropriate) to choose meaningful mathematical contexts for problems.
- ✓ Students strategically use a variety of mathematics tools (manipulatives, models, representations, and technology).